SEPTEMBER 2019 Update

Macro Base Station Transceiver Update

Major changes to the forecast over the last three months include:

1. Mobile Experts has updated our forecast for the China 5G ramp based on the political situation and the ban on component shipments to Huawei. We currently estimate that Huawei will run out of RFSoC components in the November timeframe, and will be forced to change to an internal ASIC without access to recent ARM core designs. This will have a major impact on Huawei's ability to sell 5G base stations outside of China, because we expect poor heat dissipation, linearity, and EVM performance in an internal version of the design. This quarter's forecast update reflects the expected Huawei shipments inside China only, with other operators delayed.

2. The network sharing agreement between China Telecom and China Unicom was already built into our forecast numbers, so for these two operators we have not substantially changed our forecast on the recent announcement. We are estimating that these two operators will deploy urban networks separately and rural networks together.

3. We've maintained our expectations for CBRS and C-Band spectrum release in 2020 and 2023 for the United States, leading to late ramps for these bands in the USA.

4. We've increased our forecast for 5G sub-6 GHz in European and Asian countries for 2022-2024 based on strong urban deployment over the past six months. We expect some of these deployments to go nationwide over the next four years.

5. Nationwide plans for 5G in the USA do not substantially drive our 5G sub-6 GHz forecast because in most cases these 5G upgrades will be achieved through software only. In many cases, dynamic spectrum sharing will be used to run LTE and 5G simultaneously, on existing hardware. Both Ericsson and Nokia base stations already support 5G so the FDD upgrade of 5G in the USA is not a real hardware opportunity.

6. We have slightly adjusted the mix of 16T16R and 32T32R base station configurations for 5G, based on slow movement of the 16T designs into production. This situation is fluid, as Ericsson has recently introduced a 16T variation and operators have a wide range of preferences. Expect the mix of 16T, 32T, and 64T to change constantly over the next two years as operators settle into their preferred deployment patterns.

7. We adjusted the regional transceiver forecast to reflect the expected loss of European 5G business by Huawei and the likely slowdown of the China ramp due to 5G radio redesign.

8. Market shares have been updated to match with the latest OEM earnings announcements, as well as ZTE's renewed production for a full quarter. Huawei has continued producing 5G base stations using its stockpile of Xilinx inventory, so Huawei has taken the #1 slot for 5G <6 GHz production in Q2. (Note that we expect Huawei to suffer in Q4 and early 2020 when they run out of components). Ericsson performed well in 5G with 11% networks growth YoY, and Nokia's mobile broadband networks business grew 8% YoY. Samsung has scored in 5G with early shipments in Korea, but these others are now roaring back and Samsung has dropped back to the fourth position overall. ZTE is still slow in getting started on 5G deployment but remains strong in other areas.